

Participating in Science & Engineering Fairs - A Practical Approach



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**When Somebody
Says "Science
Fair" What's
The First
Thought That
Pops Into Your
Head??**



A Science Fair Is...



If You're A Teacher:

- ▮ A Tool
- ▮ Something To Grade On
- ▮ A Creative Outlet for Students

If You're A Parent:

- ▮ Stressful...it's a PAIN!!
- ▮ Conflicts...Helplessness
- ▮ Potential Source of Pride

If You're A Student

- ▮ A Requirement For A Grade
- ▮ More Work!!
- ▮ Too Many Decisions!!!
- ▮ Fear Of Unknown

What SHOULD You Think Of?



How You Will Feel After Participating In The Science Fair

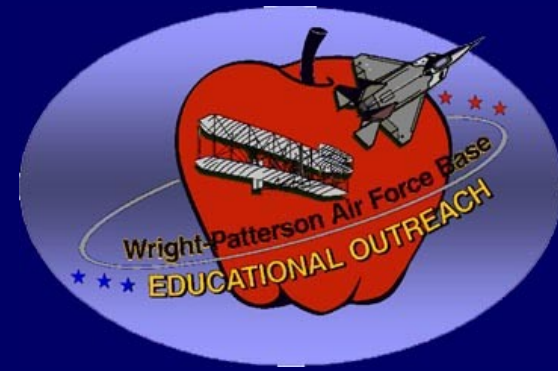
- ▮ **Pride...Not Relief!**
- ▮ **Rewarded...Not Punished**
- ▮ **Reward is an Honorable Goal!!**
- ▮ **Motivator Doesn't Always Have To Be Grades!**



***If It Motivates You...
Work for the
Rewards!!!***

***The Important
Results Will Be***

A Science Fair Project Is An Opportunity!!



Lots of Awards!

- ▢ Prizes
- ▢ Money
- ▢ Scholarships
- ▢ Summer Jobs
- ▢ Entry Into Select Colleges

By Products:

- ▢ Organization Skills
- ▢ Critical Thinking Skills
- ▢ Presentation Skills
- ▢ Sense of Self



The Recipe - Classic Science Fair "Steps"



QUESTION

RESEARC

HYPOTHESIS

PROCEDURE

EXPERIMENT

RESULTS

ANALYSIS

CONCLUSION

Scientific Method

Question - Developing the Best Question For You



Consider Your

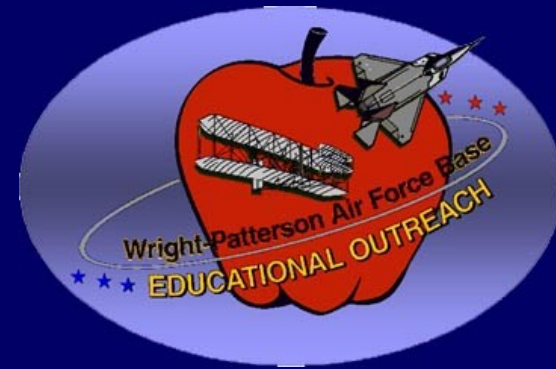
- Interests
- Knowledge Base
- Access to Mentors
- Available Equipment
- Natural Surroundings

Make A List of Each

- Look For Matches Between Rows



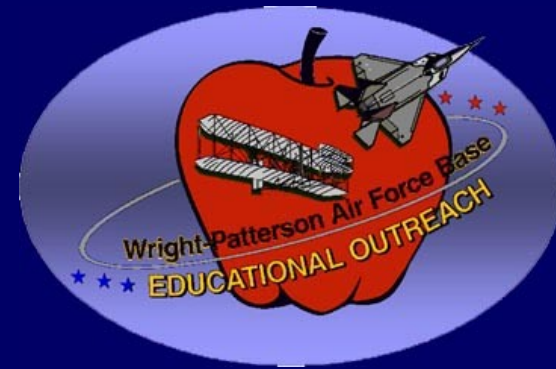
Question - Developing the Best Question For You



INTERESTS	KNOWLEDGE/ SKILLS	MENTOR	EQUIPMENT/ SURROUNDIN G
BASKETBALL	MATH	MARY - CHEMISTRY	RULERS
COMPUTER	COMPUTER GAMES	JIM - GARDENING	SCALES (BATH, FOOD, POSTAL)
BUILDING	DRIBBLING BASKETBALL	BOB - ELECTRONICS	THERMOMETERS
LEGOS	BUILDING THINGS	JANE - MECH ENG	FISH TANK
SWIMMING		BETTY - NURSE	BLOOD PRESSURE MONITOR
BIKING		ROY - PAINTER	STOP WATCH
MEDICINE			AUDIO RECORDER
			LEVEL
			RUBBER BANDS
			PRESSURE GAUGES

STEP #1 - QUESTION

Question - Developing the Best Question For Websites To Spark Ideas For You



- ▮ <http://www.stemnet.nf.ca/sciencefairs/>
- ▮ <http://www.scifair.org/ideas/index.shtml>
- ▮ <http://members.aol.com/ScienzFair/electric.htm>
- ▮ <http://halcyon.com/sciclub/cgi-pvt/scifair/guestbook.html>
- ▮ http://madsci.org/MS_search.html
- ▮ <http://youth.net/nsrc/sci/sci.index.html>
- ▮ <http://jpl.org/div/kidspage/projectguide/projects.html>
- ▮ <http://amasci.com/amateur/sciam1.html>
- ▮ <http://scitoys.com/>
- ▮ <http://www.all-science-fair-projects.com>

STEP #1 - QUESTION

Research - Get A Notebook!



- ▮ **Make A Commitment To Document Your Work**
- ▮ **Research Underlying Scientific Principles:**
 - ▮ **To Help Make Educated Guess To Answer Your Question**
 - ▮ **To Define the Test Design**
- ▮ **Internet Searches Are Great... But Don't Forget Books and People!!**

Hypothesis



- ▮ **The Hypothesis Rewords Your Question In A Way To Help You Do Your Test**
 - ▮ **Predict the Answer, State Your Reason, If Possible**
 - ▮ **Select Projects With Well Formed Hypothesis**
- ▮ **Special Cases - Engineering Projects**
 - ▮ **Recommendation: Always Have Hypothesis Listed On Poster Board, Regardless of Its Quality**

STEP #3 -

HYPOTHESIS

Procedure/Experiment Design Is Critical



- ▮ **Experiments Should Result in Data That Can Be Displayed in a Graph**
 - ▮ **Imagine the Ideal Graph(s) That Will Answer Your Question**
 - ▮ **Remember That You Will Need To Record The Data...How Will That Data Arrive?**
 - ▮ **How Long Will Data Point Stay Valid?**
 - ▮ **What Measurement Tools Do You Need?**
 - ▮ **Video Camcorders Can Help Slow Time**

STEP #4 & 5 - PROCEDURE &

Results - Perform The Experiment



- ▣ The Better You Plan, The Simpler The Test!
- ▣ Record All Testing - Even Failures
 - ▣ Record All Conditions
 - ▣ Record Qualitative Data Like Noises/Smells
 - ▣ Record Measuring Tool And Units Of Data
 - ▣ Label Each Data Run By Time Of Day
 - ▣ Take Pictures Of Test Setup, If Possible



STEP #6 - RESULTS

Analysis - Have No Fear!!



- ▮ You Analyze The Data By Putting It in the Graph**
 - ▮ Ask Questions of the Graph**
 - ▮ Report any Interesting Answers**
 - ▮ Indicate Reproducibility of Data - Show Multiple Runs on Graphs...or Use Statistics**
 - ▮ Use Different Graphs to Show Different Features**
 - ▮ Spreadsheets Are Powerful Tools**

Conclusion



- ▢ **Your Conclusion is a Summary Focused On Answering Your Question/Hypothesis**
 - ▢ **If Your Hypothesis Was Incorrect or Disproved, It is NOT a Failed Experiment!**
 - ▢ **If Your Hypothesis Was Disproved, Offer An Alternative Explanation**
 - ▢ **Always Consider What More Could Be Done**
 - ▢ **Another Test**
 - ▢ **Another Project**

Checklist - What To Ask Yourself and/or Your Mentor



- ☐ **Has Something Like This
Done Before?**
 - ☐ **Is There A "Twist" I Can Take?**

- ☐ **Do I Know The Answer To My Experiment
Before I Test It?**
 - ☐ **Is It Too Obvious?**
 - ☐ **Is There A More Interesting Question?**

- ☐ **What Do I Put In My Log Book?**
 - ☐ **Everything!! Use Like A Diary!!**

Checklist - What To Ask Yourself and/or Your Mentor



☐ How Do I Analyze?

- ☐ Use A Graph
- ☐ Use Statistics

☐ How Much Data Should I Take?

- ☐ One Run Is Not Enough!
- ☐ Do At Least Three (3)

☐ How Do I Define My Experiment?

- ☐ Start With Your Question
- ☐ Envision Graphs That Answer Your Question

Prepare For Presentation:



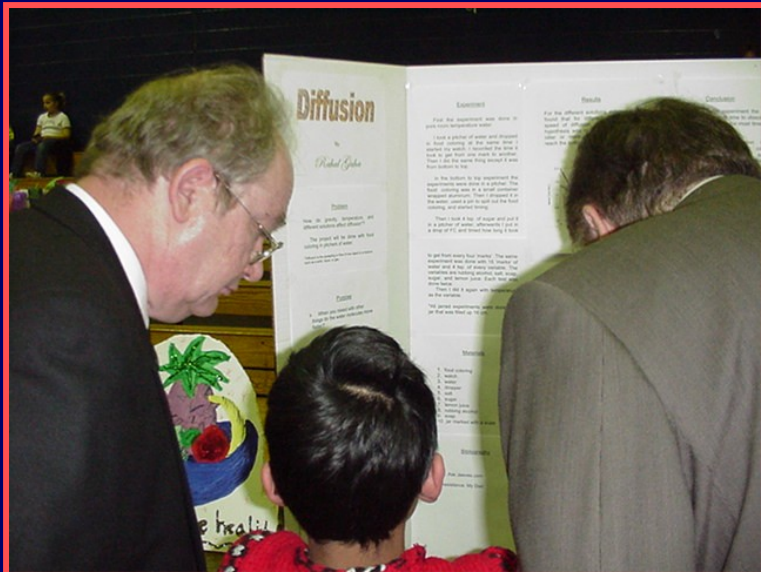
▮ The Focus Should Be Knowledge ... But In A Science Fair
IMPRESS THE JUDGES!! ...

- ▮ Anticipate Questions The Judge Will Ask
- ▮ Research The Answer
- ▮ Make Yourself A Note Card
- ▮ Practice Reciting The Answer So It Sounds Natural

Preparing For The Judges:



- Expect Questions
- Have Your Answer Ready
- Work Info Into Your



- ## Typical Questions
- Where Did The Idea For This Project Come From?
 - What Did You Learn From Your Research?
 - What Were The Important Sources Used In Your Research?

Preparing For The Judges - Typical Questions:

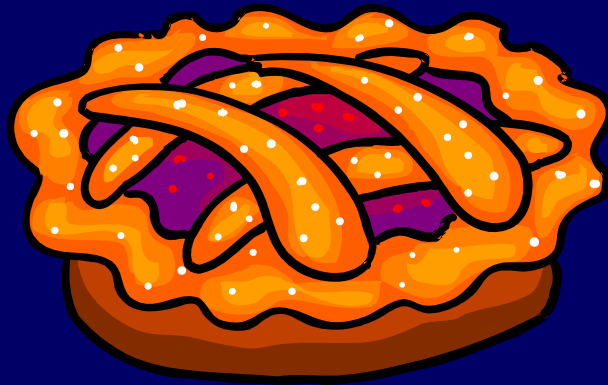


- ▮ Where did the idea for this project come from?
- ▮ What did you learn from your research?
- ▮ What were the most important sources used in your research?
- ▮ How much time did you spend on the project?
What took most of your time?
- ▮ Where did items used in your project come from?
- ▮ How many times did you run the experiment on each configuration?
- ▮ Did you use any statistics such as averaging?
- ▮ How constant were your conditions during experiments?
- ▮ What would you do differently? What more would you like to do?

Selling Yourself - Use PIE!

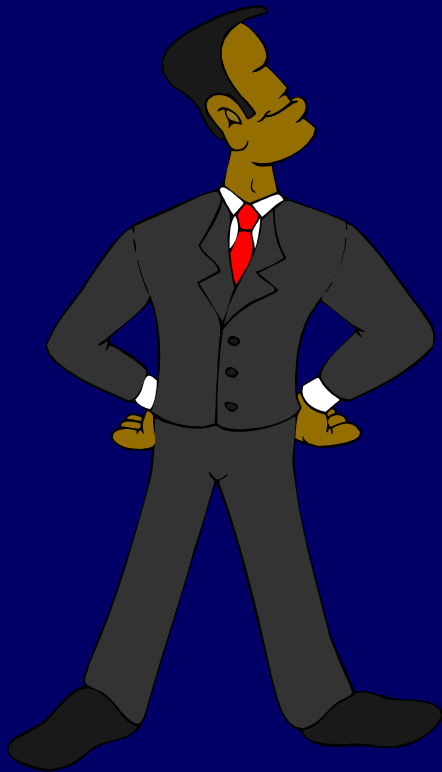


- ▮ **Performance**
- ▮ **Image**
- ▮ **Exposure**



- ▮ **Science Fairs Are A GREAT Time To Learn How To Promote Yourself**
- ▮ **Many Successful People Use PIE Principle**
- ▮ **“Performance” Already Covered**
- ▮ **Look At Image And Exposure...**

Image - The Impression You Give in Appearance and Actions:



- ▮ You Want The Judges To Relate To You And See Their History In YOUR Future!**
- ▮ Project The Image Of Being A Budding Scientist Or Engineer**
- ▮ Dress Like They Would Dress**
- ▮ Show Them You Enjoy What You're Doing...tell Stories, Ask Questions**
- ▮ Play To Their Expertise...How Could I Do This Better For The Next Fair?**

Exposure -

Make Sure The
Judges See You and

Remember You:

- Use Attention Grabbing Displays and posters

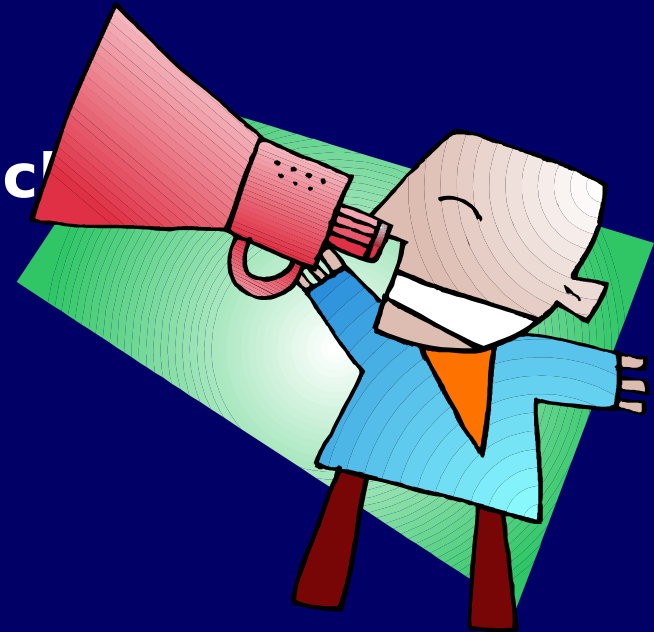
- Check the Rules!!!

- For Maximum “Traffic”, A Project That Related To Today’s Public Concerns

- Global Warming
 - Pollution
 - Water Purification
 - Security Devices
 - Genetically Altered Food,
 - Etc.



Pick



Motivation - Many Opportunities Await!



- ▮ That Future Exceptional Science and/or Engineering Student Can Be You!!
- ▮ Summer Jobs, Free Training, Camps and More Are Available Through Science Fairs!
- ▮ Places To Check:
 - ▮ **Ohio Academy of Science**
<http://www.ohiosci.org/>
 - ▮ **International Science and Engineering Fair... Make Participation in this Fair Your Goal!** <http://www.sciserv.org/isef/>

Motivation - Many Opportunities Await!



More Places To Check Out:

- ▮ **Junior Science and Humanities Symposium**
<http://www.biosciences.utoledo.edu/oishs/index.htm>
- ▮ **Science Talent Search**
<http://www.intel.com/education/sts/>
- ▮ **National Youth Science Camp**
<http://www.sciencecamp.org/>
- ▮ **National Gallery for America's Young Inventors**
<http://www.pafinc.com/gallery/index.htm>

IT REALLY WORKS!!!!

Did We Mention “Having Fun”? :

- ▮ People Throughout History Experimented with Science and Engineering “For Fun”
- ▮ Imagine Getting Paid For Doing Something You Enjoy Doing!!
- ▮ To Avoid Stress:
 - ▮ Start Your Project Early, Be Ready... then Kick Back and Enjoy!!





For Additional Information



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